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Unusual Pathogenicity of *Diphyllobothrium* sp. in a Black Bear

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The black bear, *Ursus americanus* Pallas, has been found to be an exceptionally good host for a common species of *Diphyllobothrium,* as evidenced by the large size attained by individual strobilae, and the duration of infections experimentally established. Since 1950, the writer has used at least five of these bears annually in the study of *Diphyllobothrium* spp. With the single exception reported herein, no adverse effect to the hosts has been recognized.

On July 16, 1950, a bear approximately six months of age was fed plerocercoid larvae of *Diphyllobothrium* sp. (probably *D. ursi* Rausch, 1954), taken from steelhead trout, *Salmo gairdnerii* Richardson, which had been collected on the upper Kenai Peninsula, Alaska. This animal had been captured before weaning, and had been in captivity about two months before infection was attempted. On November 1, 1950, about three and one-half months after the feeding of the larvae, the bear was found dead in its cage. The *post mortem* findings are described.

On opening the abdominal cavity, a necrotic lesion seven mm. in diameter and five mm. deep was noted on the antero-ventral surface of the pancreas. The organ was somewhat enlarged, but no abnormal color was recognized. Upon opening the duodenum, the papillae of the pancreatic ducts were readily identified; protruding from each was the strobila of a cestode of the genus *Diphyllobothrium*. The scolices and anterior parts of the strobilae had penetrated a considerable distance up the pancreatic ducts. The two ducts opened about ten mm. apart, and their papillae were enlarged and edematous. At the level of the duodenal mucosa, one strobila measured five mm. wide, and the other measured three mm. After fixation of the organ, with the cestodes *in situ*, a block cut from the ventral part of the gland disclosed that the cestodes had penetrated deeply, and the two ducts appeared to be completely occluded by the strobilae and the inflammatory reaction evoked by them (Fig. 1). Only these two cestodes were present.

Microscopically, sections showed that an abcess directly connected with an occluded pancreatic duct had ruptured into the peritoneal cavity. The ducts were necrotic, and contained great numbers of polymorphonuclear neutrophils. The peritoneal surface of the organ was covered with fibropurulent exudate enclosing large numbers of degenerating cestode eggs. The abcess cavity was largely filled with polymorphonuclear neutrophils, and

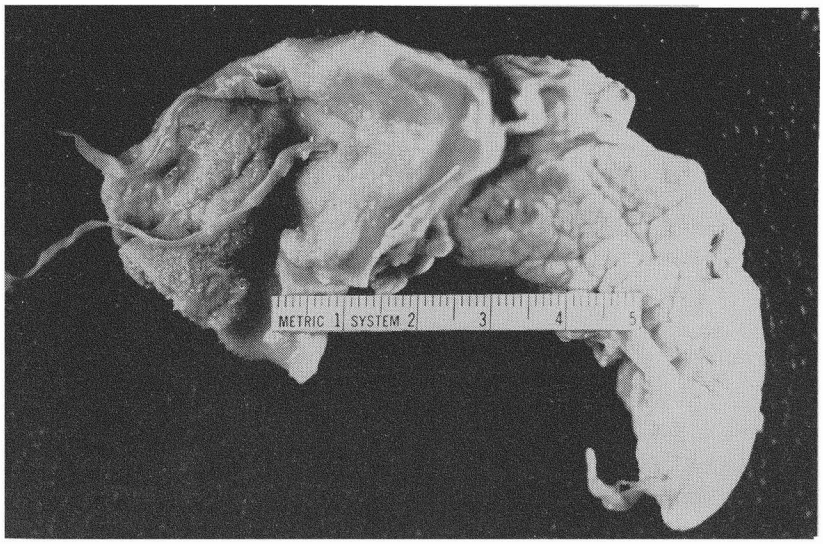

Fig. 1. Pancreas and section of duodenum of infected bear; cestodes protruding from pancreatic ducts into duodenum.

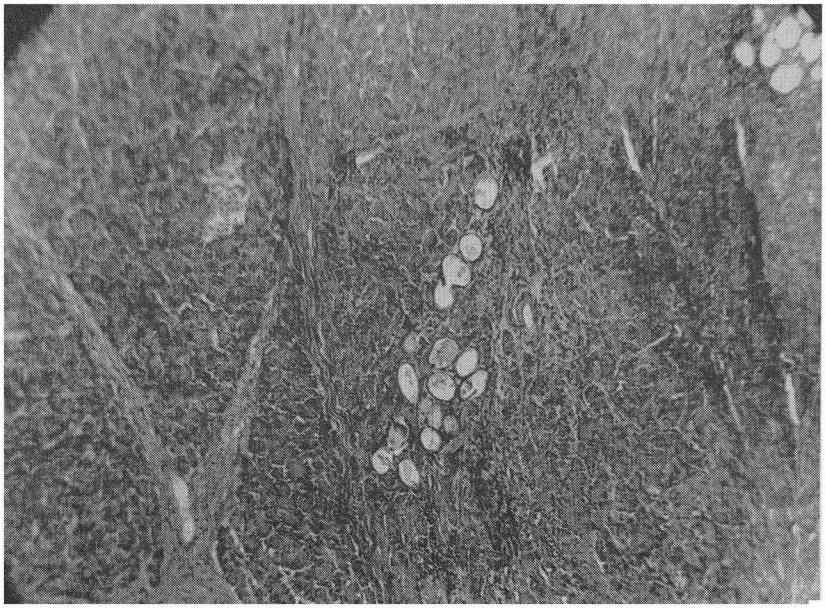

Fig. 2. Eggs of *Diphyllobothrium* sp. in lobule of pancreas. Photographed at 100 X.

numerous eggs were entrapped by the exudate. Adjacent parts of the gland showed evidence of chronic inflammation, with fibrosis and replacement of the lobules of the gland. There was local hyperplasia of the epithelium of the pancreatic ducts. Many eggs had become distributed through the gland by means of the smaller ducts. Some were surrounded by dense connective tissue, and others were found deep within the tissue of the lobules (Figs. 2-3). Locally, eggs were surrounded by macrophages and were undergoing phagocytosis and degeneration. No giant cells were observed.

Numerous eggs in the exudate escaped into the peritoneal cavity. These caused enough local irritation to evoke an inflammatory reaction. Aggregations of eggs enclosed by a thin layer of polymorphonuclear neutrophils were scattered over the peritoneal surface of the pancreas. The degree of inflammatory reaction observed around the eggs in the lobules was slight, and macrophages were few.

The writer is unaware of any report in the literature describing the tissue reaction to cestode eggs in the mammalian host. However, in the absence of giant cells the reaction in the bear resembled that described by Africa and de Leon (1938), involving the eggs of certain heterophyid trematodes.

Although the specific cause of death in the bear was not determined, it is evident that the cestodes were the essential factor. In some parts of Alaska, such as the Yukon-Kuskokwim delta region, *Diphyllobothrium* sp. is a prevalent parasite in the Eskimo. The usual pathogenicity, if any, of this cestode in man has not been clearly defined, but it is possible that invasion of the pancreatic ducts as described herein might also occur.

LITERATURE CITED

AFRICA, C. M. and W. DE LEON. 1938. Observations on the mechanism of phagocytosis of various helminth ova. Livro Jubilar do Prof. Lauro Travassos, pp. 1-10.

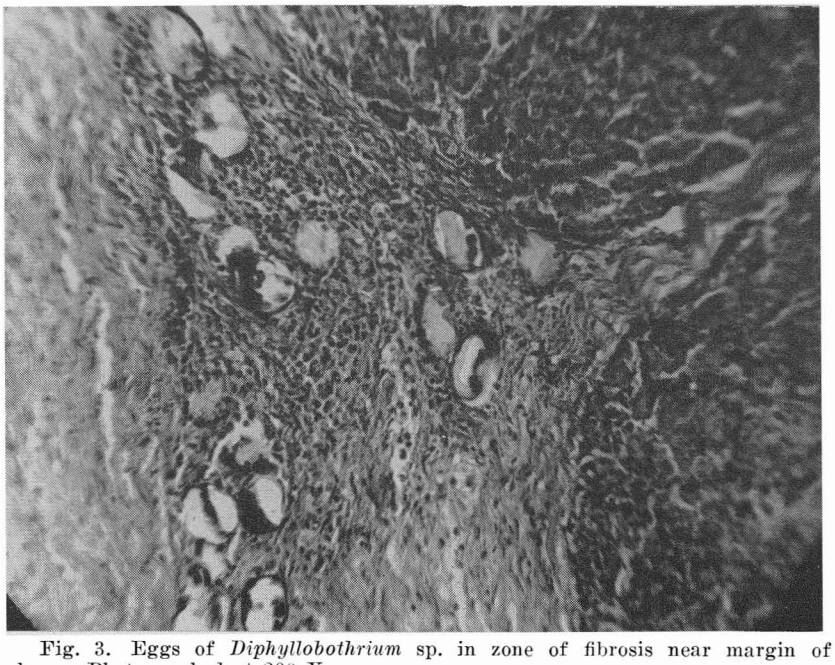

Fig. 3. Eggs of *Diphyllobothrium* sp. in zone of fibrosis near margin of abcess. Photographed at 200 X.